**WASHINGTON DEPARTMENT OF ECOLOGY**

**ENVIRONMENTAL ASSESSMENT PROGRAM**

**FRESHWATER MONITORING UNIT**

**STREAM DISCHARGE TECHNICAL NOTES**

**STATION ID:** 30C070

**STATION NAME:** Little Klickitat River near Wahkiacus

**WATER YEAR:** WY2006

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## Introduction

Watershed Description

The Little Klickitat River flows in south central Washington from the Simcoe Mountains and Horse Heaven Hills west across the Munson Prairie and through the Little Klickitat Canyon to its confluence with the Klickitat River. The watershed drains approximately 280 square miles and includes range, agricultural, and forest lands. The river has been designated as Class A and is used primarily for irrigation, stock watering, and aquatic life habitat.

Gage Location

The gage is 15 miles west of Goldendale on the south side of State Highway 142. The gage is on the right bank 400 feet upstream from the Hwy 142 Bridge and 1/4 mile upstream from the confluence with the Klickitat River. The staff gage which served as the Primary Gage Index (PGI) was destroyed in December. A sloping staff gage was installed near the gage house in April and is now the PGI.

Table 1.

| | |
|---|---|
| Drainage Area (square miles) | 280 |
| Latitude (degrees, minutes, seconds) | 45, 50, 32 North |
| Longitude (degrees, minutes, seconds) | 121, 03, 29 West |

**Discharge**

Table 2. Discharge Statistics.

| | |
|---|---|
| Mean Annual Discharge (cfs) | 127 |
| Median Annual Discharge (cfs) | 42 |
| Maximum Daily Mean Discharge (cfs) | 773 |
| Minimum Daily Mean Discharge (cfs) | 24 |
| Maximum Instantaneous Discharge (cfs) | 863 |
| Minimum Instantaneous Discharge (cfs) | 23 |
| Discharge Equaled or Exceeded 10 % of Recorded Time (cfs) | 294 |
| Discharge Equaled or Exceeded 90 % of Recorded Time (cfs) | 26 |
| Number of Days Discharge is Greater Than Range of Ratings | 0 |
| Number of Days Discharge is Less Than Range of Ratings | 0 |

Note: Statistics displayed in Table 2 may not include values in which the predicted discharge exceeds the range of ratings.

**Narrative**

These discharge statistics do not represent a complete record for WY2006. Much of the data record from early December thru mid March is either missing or considered unreliable due to ice damage and other instrument problems. For most of the missing data, there are no suitable reference data from nearby stations that can be used to fill the gaps.

**Error Analysis**

Table 3. Error Analysis Summary.

| | |
|---|---|
| Logger Drift Error (% of discharge) | N/A |
| Weighted Rating Error (% of discharge) | 15% |
| Total Potential Error (% of discharge) | N/A |

**Rating Table(s)**

Table 4. Rating Table Summary

| Rating Table No. | 1 | 2 | 3 |
|---|---|---|---|
| Period of Ratings | 4/20/05 - 12/25/05 | 12/25/05 - 3/22/06 | 2/16/06 - 9/30/06 |
| Range of Ratings (cfs) | 5.5 to 451 | 5.5 to 900 | 1.0 to 2110 |
| No. of Defining Measurements | 9 | 9 | 36 |
| Rating Error (%) | 20% | 20% | 12% |

| Rating Table No. | 4 | | |
|---|---|---|---|
| Period of Ratings | 9/7/06 - 9/30/06 | | |
| Range of Ratings (cfs) | 12 to 2110 | | |
| No. of Defining Measurements | 32 | | |
| Rating Error (%) | 11% | | |

| Rating Table No. | | | |
|---|---|---|---|
| Period of Ratings | | | |
| Range of Ratings (cfs) | | | |
| No. of Defining Measurements | | | |
| Rating Error (%) | | | |

**Narrative**

Table 1 uses the original staff gage as its Primary Gage Index (PGI). This staff was destroyed during ice break-up in late December. Table 2 is a transitional table that copies Table 1 while applying the -1.84 feet datum shift that occurred as the old staff was lost and the new sloping staff was adopted. Table 3 was developed using more than 30 measurements taken after the staff replacement. Table 4 shows a small amount of fill at the low end of the Table 3 curve, probably due to leaf- and small–woody-debris buildup in the fall. Clones of Tables 3 and 4 have recurred throughout the period of record.

**Stage Record**

Table 5. Stage Record Summary

| | |
|---|---|
| Minimum Recorded Stage (feet) | 3.24 |
| Maximum Recorded Stage (feet) | 8.47 |
| Range of Recorded Stage (feet) | 5.23 |
| Number of Un-Reported Days | 81 |
| Number of Days Qualified as Estimates | 99 |
| Number of Days Qualified as Unreliable Estimates | 0 |

**Narrative**

The minimum recorded valid stage value is 3.24 feet, occurring on several dates in mid- to late August. A datum shift of -1.84 feet occurs in the stage record on 12/25/2005. Prior to that date, the record has an unsurveyed staff gage as its PGI. That staff was destroyed in late December during the breakup of heavy ice cover. Intermittent bubbler gage problems also caused much of the continuous record to be unusable between December and March. The useable data in that period are qualified as estimates because of the lack of valid QA stage observations. Referencing of data to the datum for a new surveyed sloping staff gage begins on December 25. Most continuous gage problems ended with repairs made on March 22. New bubbler gage problems caused data gaps in late August and early September. Most of the lost record in the latter period was replaced using reference data from another station. The failing bubbler system was replaced on September 6.

**Modeled Discharge**

Table 6. Model Summary

| | |
|---|---|
| Model Type (Slope conveyance, other, none) | Slope conveyance |
| Range of Modeled Stage (feet) | 6.0 to 8.8 ft. |
| Range of Modeled Discharge (cfs) | 693 to 2110 cfs |
| Valid Period for Model | 3/22 to 9/30/06 + |
| Model Confidence | 4% |

**Surveys**

Table 7. Survey Type and Date (station, cross section, longitudinal)

| Type | Date |
|---|---|
| Station Survey | 4/18/2006 |

**Activities Completed**

| |
|---|
| Replaced Pressure Transducer in CampbellSci DCP 12/14 |
| Installed temporary Tapedown RP as PGI on 3/22 |
| Installed sloping staff as new PGI on 4/18 |
| Replaced CampbellSci DCP with Design Analysis DCP on 9/6 |